Public Comment to HHS: Radiofrequency EMF Health Risks

Oct 20, 2026

Docket HHS-OASH-2026-0397. Responding to Questions 2, 3, 5, 6, 8, 9, 10, 11, 12, 13, 14, 15, 16 and 17.

Perspective (Question 2): Individual member of the public. This comment relies on peer-reviewed research, U.S. and international government reports, and federal court records, all cited below, and on my own measurements (Question 3).

Summary

U.S. radiofrequency (RF) exposure limits were set in 1996 to prevent a single harm, tissue heating. They have never been revised to account for biological effects at non-heating levels, for long-term exposure, or for children. Since 1996, the evidence that these limits do not protect public health has grown substantially:

- **2011:** The World Health Organization's International Agency for Research on Cancer (IARC) classified RF radiation as "possibly carcinogenic to humans" (Group 2B).
- **2018:** The U.S. National Toxicology Program (NTP), in the largest animal study of cell phone radiation ever conducted, found "clear evidence" of malignant heart tumors in male rats.
- **2018:** Italy's Ramazzini Institute found the same rare tumor type in rats exposed to cell-tower-type signals at levels below the FCC's public limit.
- **2021:** A federal appeals court ruled that the FCC had failed to explain how its limits protect against non-cancer harms, long-term exposure, or effects on children.

Children absorb more RF energy into their heads than adults do, and their developing nervous systems are more susceptible. Yet compliance testing still uses a model of a large adult male head, and wireless antennas continue to be placed on and beside schools, where children have no choice about their exposure.

I ask HHS to:

1. Establish biologically based RF exposure limits, set by a health agency rather than a telecommunications regulator.

2. Adopt specific protections for children, including keeping wireless infrastructure away from schools and childcare facilities.
3. Fund the long-term research the federal government has left unfinished, and make exposure information public.

Personal measurements (Question 3)

My response to Question 3 is based on my own measurements in and around my home, not on a medical diagnosis.

Instruments. I used a TriField EMF Meter TF2, which measures magnetic fields, electric fields and RF, and a Safe and Sound Pro II broadband RF meter.

Measuring made me aware of how much exposure came from sources I had never thought about, such as a Wi-Fi router transmitting 24 hours a day and wiring inside the walls. A few simple changes cut my measured exposure to a fraction of its previous level.

Power lines near homes and parks. I have also measured fields near homes beside overhead power lines. Readings there were consistently off the scale of my meters. Many parks and walkways in my area run alongside power lines, leaving residents little escape when they seek time in nature.

Power-line fields carry their own cancer classification. In 2002, IARC classified extremely low frequency (ELF) magnetic fields, the type produced by power lines, as possibly carcinogenic to humans (Group 2B), based on studies of childhood leukemia (IARC, 2002). Two pooled analyses found that children with average home exposures above 0.3 to 0.4 μT (3 to 4 mG) had roughly 1.7 to 2 times the risk of leukemia (Ahlbom et al., 2000; Greenland et al., 2000). A study of England and Wales found higher leukemia risk among children born within 200 meters of high-voltage lines (Draper et al., 2005).

Current U.S. limits protect only against heating (Questions 5 and 6)

The FCC adopted today's RF exposure limits in 1996, based on guidelines from the National Council on Radiation Protection and Measurements (1986) and the IEEE (1991). In 2019 the FCC closed its review and left them unchanged.

The limits rest on one assumption: that the only established harm from RF energy is heating. The whole-body limit traces to 1980s experiments in which rats and monkeys stopped performing trained tasks at about 4 watts per kilogram (W/kg), a level that

measurably raises body temperature. That threshold was divided by 50 to set the public limit of 0.08 W/kg. The localized limit for the head, which governs cell phones, is 1.6 W/kg averaged over 1 gram of tissue.

This design leaves four gaps:

- **Non-thermal effects.** A limit built to prevent heating cannot, by construction, protect against biological effects that occur without heating. The sections below document such effects.
- **Duration.** Public exposure limits are averaged over 30 minutes. Nothing in them accounts for daily exposure sustained over years or decades, which is the reality for today's children.
- **Signal characteristics.** Limits are based on average power. They treat a pulsed, modulated Wi-Fi or 5G signal the same as a steady wave of equal average power, although laboratory studies report that biological effects depend on modulation and pulsing (Panagopoulos et al., 2015; ICBE-EMF, 2022).
- **Children.** The safety threshold was derived from the behavior of adult animals and is assessed with adult-sized models (see Question 11 below).

The U.S. Environmental Protection Agency acknowledged the first gap in 2002. Its radiation office wrote that the FCC guidelines protect against thermal effects "but not from all possible mechanisms," and that assuming they protect against harm by any mechanism "is not justified" (EPA, Hankin letter, 2002).

Cancer evidence below and near current limits (Questions 6 and 12)

Three independent lines of evidence (an international classification, two large animal studies, and human case-control studies) point to the same tumor types.

IARC classification. In 2011, a working group of 30 scientists from 14 countries classified RF electromagnetic fields as "possibly carcinogenic to humans" (Group 2B), based on increased risks of glioma and acoustic neuroma in heavy phone users (Baan et al., 2011). In 2019, an IARC advisory group recommended RF for re-evaluation as a high priority (IARC Advisory Group, 2019).

U.S. National Toxicology Program (2018). NTP exposed rats to 2G and 3G cell phone signals for 9 hours a day, from before birth through two years. It found:

- "Clear evidence" of malignant schwannomas of the heart in male rats, NTP's highest level of evidence
- "Some evidence" of malignant gliomas of the brain and of adrenal gland tumors in male rats
- Significant increases in DNA damage in the brains of exposed rats and mice (Smith-Roe et al., 2020)

The lowest whole-body exposure tested, 1.5 W/kg, is close to the 1.6 W/kg the FCC permits in the head of a phone user. The tumor types matter: gliomas arise from glial cells, and acoustic neuromas are schwannomas of the nerve to the ear. These are the same cell types implicated in human studies of heavy phone users.

Ramazzini Institute (2018). Researchers exposed 2,448 rats to a 1.8 GHz cell-tower signal for 19 hours a day, from before birth until natural death. Male rats at the highest exposure, 50 V/m, had a statistically significant increase in heart schwannomas, the same rare tumor NTP found (Falcioni et al., 2018). **At 1.8 GHz, 50 V/m is about two-thirds of the FCC's public exposure limit** (roughly 61 V/m). Two laboratories, using different exposure systems, different signals and different exposure levels, found the same tumor.

Human studies of heavy and long-term users.

Study	Population	Finding for glioma
Interphone (13 countries, 2010)	Highest tenth of cumulative call time (1,640+ hours)	40% higher risk (OR 1.40, 95% CI 1.03–1.89); higher still for tumors in the temporal lobe, nearest the ear
CERENAT (France, 2014)	Heaviest users (896+ cumulative hours)	Nearly tripled risk (OR 2.89, 95% CI 1.41–5.93)
Hardell & Carlberg (Sweden, pooled, 2015)	Mobile phone use for more than 25 years	Tripled risk (OR 3.0, 95% CI 1.7–5.2); risk rose with each 100 hours of use and each year since first use

The pattern is consistent: risk rises with more hours of use and more years since first use. That is the dose-response relationship expected of a real effect.

Time matters here. Brain cancers caused by known carcinogens, such as ionizing radiation, can take decades to appear. Today's children are the first generation exposed from infancy, and no study can yet measure their lifetime risk.

Biological effects at non-heating levels (Question 12)

Peer-reviewed studies report biological effects at exposures that cause no measurable heating, which the current limits do not consider.

- **Oxidative stress.** A review of 100 peer-reviewed studies of low-intensity RF found that 93 reported oxidative effects in biological systems (Yakymenko et al., 2016). Oxidative stress is an established pathway to DNA damage and chronic disease.
- **DNA and cellular damage.** Beyond NTP's findings in rodent brains (Smith-Roe et al., 2020), people living within 80 meters of cell towers showed lower antioxidant levels and greater oxidative damage in their blood cells than people living more than 300 meters away (Zothansiama et al., 2017).
- **Male fertility.** A meta-analysis of 10 studies covering 1,492 samples linked mobile phone exposure to an 8.1% drop in sperm motility and a 9.1% drop in sperm viability (Adams et al., 2014).
- **Prenatal exposure and behavior.** In a Danish cohort of more than 13,000 children, those exposed to cell phones both before and after birth had 80% higher odds of behavioral problems by age 7 (OR 1.80, 95% CI 1.45–2.23) (Divan et al., 2008).
- **Brain development in animals.** Mice exposed in the womb to cell phone radiation were hyperactive, had impaired memory, and showed dose-dependent changes in signaling in the brain's prefrontal cortex (Aldad et al., 2012).
- **Memory in adolescents.** A Swiss study that followed adolescents for one year found that a higher cumulative RF dose to the brain was associated with poorer development of figural memory. The effect was concentrated in those who held their phone to the right side of the head, near the brain region that handles figural memory (Foerster et al., 2018).

The BioInitiative Report, prepared by 29 independent scientists and health experts and covering about 1,800 studies in its 2012 edition, reached the same conclusion: biological effects occur at exposures far below current limits, and precautionary limits are warranted (BioInitiative Working Group, 2012).

Children absorb more and are more vulnerable (Question 11a)

Exposure assessment must differ for children. They absorb more RF energy, their nervous systems are still developing, and they will carry their exposure across a longer lifetime. The American Academy of Pediatrics told the FCC in 2012 that children "are

disproportionately impacted by all environmental exposures, including cell phone radiation" (AAP, 2012).

Thinner skulls, higher absorption from devices. Children's skulls are thinner, their heads are smaller, and their tissues hold more water, which absorbs RF energy more readily. Modeling funded by Germany's Federal Office for Radiation Protection found that exposure of some brain regions in young children can be about twice that of adults, and that exposure of the bone marrow in a child's skull can be up to ten times higher (Christ et al., 2010). Other modeling studies have confirmed greater absorption in children's brains and eyes (Gandhi et al., 2012; Fernández et al., 2018). This matters for phones held to the head and for tablets and laptops held close to the body.

Higher whole-body absorption from towers and Wi-Fi. For distant sources such as cell towers and Wi-Fi routers, a small child's body absorbs more energy relative to its size at common wireless frequencies. A study of six children and two adults found that at exposures meeting international reference levels, whole-body absorption in small children exceeded the basic safety limit by up to 45% (Bakker et al., 2010). The U.S. limit is weaker still at cellular frequencies: at 900 MHz, the FCC allows 6 W/m² for the public, one-third more than the international reference level of 4.5 W/m².

Developing nervous systems. The brain continues to develop through adolescence. The findings on behavior after prenatal exposure (Divan et al., 2008), on memory and brain signaling in mice exposed before birth (Aldad et al., 2012), and on memory in adolescents (Foerster et al., 2018) all point to the developing brain as a target.

Lifetime dose. Children now begin using wireless devices in infancy and spend six or more hours a day in Wi-Fi-equipped classrooms. They will accumulate decades more exposure than any adult alive today, and the human studies above show risk rising with years of use.

Cell towers on and near schools (Question 15a)

A child can put down a phone but cannot turn off a tower. An antenna on or beside a school exposes children for six or more hours a day, about 180 days a year, for up to 13 years, without their consent or their parents'.

The evidence on base-station exposure.

- The Ramazzini study is the closest experimental model of lifelong base-station exposure. It found heart tumors in rats at about two-thirds of the FCC's public limit (Falcioni et al., 2018).

- In a study of 217 students aged 13 to 16 at two schools with towers within 200 meters, students at the higher-exposure school performed worse on tests of motor skills and spatial working memory (Meo et al., 2019). The higher exposure measured, 10 μW/cm² at 925 MHz, is less than 2% of the FCC's public limit at that frequency (about 617 μW/cm²).
- Residents living within 80 meters of base stations showed signs of oxidative damage in their blood cells compared with residents more than 300 meters away (Zothansiama et al., 2017).

Federal law silences local health objections. Section 704 of the Telecommunications Act of 1996 bars state and local governments from regulating the placement of wireless facilities on the basis of RF emissions, as long as the facilities meet FCC limits (47 U.S.C. § 332(c)(7)(B)(iv)). A school board or town cannot reject a tower on health grounds. The adequacy of the federal limit is therefore the only protection children have, which makes HHS's review of that limit critical.

Others have already acted.

- **Los Angeles Unified School District** restricted cell towers on its school sites in 2000 and in 2009 adopted a resolution opposing towers in close proximity to schools.
- **Loudoun County, Virginia**, school board voted 8–0 (one abstention) in September 2024 to bar new cell towers on school grounds for five years, after parents raised concerns about RF exposure.
- **The International Association of Fire Fighters** in 2004 opposed placing cell towers on fire stations, where its members live during 24-hour shifts, until their health effects are studied.
- **The Council of Europe** (Resolution 1815, 2011) recommended that schools favor wired internet connections and strictly regulate pupils' mobile phone use on school premises.
- **France** (2015 law) banned Wi-Fi in childcare facilities for children under three and requires Wi-Fi in primary schools to be switched off when not in use for teaching.

New technologies are multiplying exposure (Question 13)

Each new wireless technology adds transmitters that sit closer to people, operate more of the time, and use frequencies with less health research behind them. No agency assesses the combined result.

- **5G and small cells.** 5G depends on many more antennas, often mounted on streetlights and utility poles beside homes and schools. In 2018 the FCC limited the time and fees local governments may impose on small-cell permits, speeding deployment (FCC 18-133).
- **5G and 6G frequencies.** 5G adds higher frequencies, including millimeter waves above 24 GHz, that neither NTP nor Ramazzini studied, and 6G is expected to go higher still. A review of 94 studies at 6 to 100 GHz, funded by Deutsche Telekom, found that 80% of animal studies and 58% of cell studies reported biological responses. It concluded that the available research is insufficient for a meaningful safety assessment (Simkó & Mattsson, 2019).
- **Wi-Fi, smart meters, smart homes and IoT.** Routers, smart meters, smart speakers and connected appliances transmit day and night, including where people sleep. My own measurements (Question 3) show how much a single router contributes, and how much of that is unnecessary.
- **Wearables and wireless medical devices.** Smartwatches, fitness trackers and wireless earbuds transmit against the skin or inside the ear for hours each day.
- **Satellites, smart cities and autonomous vehicles.** Constellations of thousands of low-Earth-orbit satellites, sensors in public spaces and vehicle-to-vehicle communications extend coverage to places that were once free of it.

The result is rising ambient exposure across the environment (Levitt et al., 2022, Part 1). Because device limits and site limits are evaluated separately, no one evaluates a person's total exposure from all of these sources together.

Effects on wildlife and the environment (Question 14)

U.S. RF limits were written for humans. No federal standard protects birds, insects, trees or other wildlife, and evidence of effects on them is growing.

- **Federal wildlife experts have raised concerns.** In 2014, the Department of the Interior told the National Telecommunications and Information Administration that FCC radiation standards are based on thermal heating, "a criterion now nearly 30 years out of date and inapplicable today." It called for independent studies of radiation effects on migratory birds (U.S. Department of the Interior, 2014).
- **Birds.** In fully double-blinded experiments, European robins lost the ability to use their magnetic compass when exposed to ordinary urban electromagnetic noise (50 kHz to 5 MHz) on a university campus. They regained it when their huts were screened (Engels et al., 2014).

- **Insects.** Modeling of four insect species found that they absorb more RF energy at frequencies above 6 GHz. Shifting just 10% of exposure to these higher 5G frequencies would increase the power insects absorb by 3% to 370% (Thielens et al., 2018).
- **Trees.** In a study of 120 trees, damage near mobile phone base stations appeared first on the side facing the antenna, where measured radiation was higher. Trees in low-radiation areas showed no damage (Waldmann-Selsam et al., 2016).
- **Wildlife broadly.** Reviews have documented effects on orientation, migration, reproduction and survival in birds, bees, amphibians and mammals near transmitters (Balmori, 2009; Levitt et al., 2022, Part 2).

The 2021 court ruling discussed below also ordered the FCC to address environmental effects.

Compliance testing does not reflect real use (Questions 5n and 8)

Even on their own terms, the limits are checked with methods that understate what real people, and especially children, absorb.

- **An adult male head stands in for everyone.** Phones are certified using the Specific Anthropomorphic Mannequin (SAM), a model based on the heads of the largest 10% of U.S. military recruits measured in 1989. It does not represent a child's smaller head, thinner skull or more absorbent tissue (Gandhi et al., 2012). Anatomically detailed child models have existed for more than a decade but are not required.
- **Phones are tested away from the body.** Body-worn testing allows a gap between the phone and the test model, while people carry phones in pockets and hold them against their bodies. When France's radio regulator tested phones in contact with the body, it found exceedances. In September 2023 it ordered Apple to stop selling the iPhone 12 in France after measuring 5.74 W/kg in a limb test, against a limit of 4.0 W/kg (ANFR, 2023).
- **No one measures a child's total exposure.** Device emissions (SAR) and ambient exposure from towers and Wi-Fi are assessed under separate rules. Nothing accounts for a child's combined daily dose from a phone, a tablet, classroom Wi-Fi and a tower on the roof.
- **Towers are rarely measured after installation.** Compliance is typically demonstrated with calculations submitted by the operator, not routine field measurements where children actually spend their days.

No health agency stands behind these limits (Questions 5 and 17)

The body that sets U.S. RF limits is a telecommunications regulator, and a federal court has already found its reasoning inadequate.

The 2021 court ruling. In *Environmental Health Trust v. FCC* (D.C. Cir. 2021), the court held that the FCC's 2019 decision to keep its limits was arbitrary and capricious. The FCC had failed to give a reasoned explanation that its limits protect against harms other than cancer. The court ordered the FCC to address:

1. Effects on children
2. The health implications of long-term exposure
3. The ubiquity of wireless devices and other technological changes since 1996
4. Effects on the environment

In September 2026, five years after the ruling, the FCC opened a comment period narrowly focused on these remanded issues.

Federal research has stalled. After its 2018 findings, NIEHS stated in 2024 that it has no plans to conduct additional RF exposure studies at this time, citing cost and technical difficulty, and noted that its exposure system does not represent 4G or 5G networks (NIEHS, 2024). The networks children are exposed to today have never been tested in a federal long-term animal study.

Industry influence is documented.

- A systematic review in *Environmental Health Perspectives* found that studies funded exclusively by industry were far less likely to report effects of mobile phone exposure than studies with public or mixed funding (Huss et al., 2007).
- A 2015 report published by Harvard's Edmond J. Safra Center for Ethics described the FCC as a "captured agency" dominated by the industries it regulates (Alster, 2015).

Independent scientists disagree with the limits. More than 250 scientists who have published peer-reviewed research on electromagnetic fields have signed the International EMF Scientist Appeal, calling for stronger exposure guidelines (EMF Scientist Appeal, 2015). The International Commission on the Biological Effects of Electromagnetic Fields concluded in 2022 that the assumptions underlying the FCC and ICNIRP limits are not supported by the scientific evidence (ICBE-EMF, 2022).

Recommendations (Questions 5n, 5o, 9, 10, 11, 13, 14, 15, 16 and 17)

Standards (Question 5n)

1. HHS should develop health-based RF exposure limits and recommend that the FCC adopt them. Over the long term, a health agency, not a telecommunications regulator, should set these limits.
2. New limits should be based on biological effects rather than heating alone, and should account for long-term exposure, pulsed and modulated signals, and children. The precautionary levels proposed in the BioInitiative Report should be considered as a reference.
3. Device testing should use child head and body models and place phones in contact with the body, as people actually use them.

Children and schools (Questions 11 and 15)

4. HHS should recommend that no cellular antennas be placed on schools or childcare facilities, and that protective setback distances apply nearby.
5. HHS should recommend wired internet connections in classrooms, and that Wi-Fi be switched off when not in use, as the Council of Europe recommends and France requires.
6. HHS should ask Congress to restore the ability of communities and school boards to weigh health when deciding where wireless facilities go.

Disclosure (Question 9)

7. Measured RF levels at every school and childcare facility, and the locations of nearby antennas, should be publicly available.
8. SAR values and the test separation distance should be shown on device packaging and at the point of sale.
9. HHS should issue plain-language guidance for families on reducing exposure (using speakerphone or wired headsets, keeping phones off the body and out of beds), as the California Department of Public Health did in 2017.
10. Magnetic field levels near power lines alongside homes, schools, parks and walkways should be measured and published.

Research and surveillance (Questions 10, 13, 14, 16 and 17)

11. NIH should fund long-term animal studies using current 4G and 5G signals, including replication of the heart and brain tumor findings from NTP and Ramazzini.

12. CDC and NIH should launch a prospective cohort study of children that uses personal exposure meters, and should track brain tumor incidence by tumor location in cancer registries.
13. Federal agencies should measure ambient RF levels nationally, including at schools and in public spaces, and track how they change as 5G, satellite and IoT networks expand.
14. Before new frequency bands are deployed at scale, federal agencies should study their effects on pollinators, birds and other wildlife, as the Department of the Interior urged in 2014.
15. FDA should exercise its existing authority over radiation-emitting electronic products to evaluate device emissions independently.
16. All federal research and advisory panels on RF should be free of industry funding and conflicts of interest.

Conclusion

When there is credible evidence of serious, irreversible harm, the absence of complete certainty is not a reason to delay protection. That evidence exists: an international cancer classification, two independent animal studies finding the same rare tumor, consistent findings in heavy long-term users, and a federal court ruling that the current limits lack a reasoned basis. Children bear the greatest risk and have the least say. HHS has the expertise and the responsibility to act, and I urge it to do so.

References

Peer-reviewed studies

- Adams JA, et al. Effect of mobile telephones on sperm quality: a systematic review and meta-analysis. *Environment International*. 2014;70:106–112. doi:10.1016/j.envint.2014.04.015
- Ahlbom A, et al. A pooled analysis of magnetic fields and childhood leukaemia. *British Journal of Cancer*. 2000;83(5):692–698. doi:10.1054/bjoc.2000.1376
- Aldad TS, et al. Fetal radiofrequency radiation exposure from 800–1900 MHz-rated cellular telephones affects neurodevelopment and behavior in mice. *Scientific Reports*. 2012;2:312. doi:10.1038/srep00312
- Baan R, et al. Carcinogenicity of radiofrequency electromagnetic fields. *Lancet Oncology*. 2011;12(7):624–626. doi:10.1016/S1470-2045(11)70147-4

- Bakker JF, et al. Assessment of induced SAR in children exposed to electromagnetic plane waves between 10 MHz and 5.6 GHz. *Physics in Medicine and Biology*. 2010;55(11):3115–3130. doi:10.1088/0031-9155/55/11/009
- Balmori A. Electromagnetic pollution from phone masts. Effects on wildlife. *Pathophysiology*. 2009;16(2–3):191–199. doi:10.1016/j.pathophys.2009.01.007
- Christ A, et al. Age-dependent tissue-specific exposure of cell phone users. *Physics in Medicine and Biology*. 2010;55(7):1767–1783. doi:10.1088/0031-9155/55/7/001
- Coureau G, et al. Mobile phone use and brain tumours in the CERENAT case-control study. *Occupational and Environmental Medicine*. 2014;71(7):514–522. doi:10.1136/oemed-2013-101754
- Divan HA, et al. Prenatal and postnatal exposure to cell phone use and behavioral problems in children. *Epidemiology*. 2008;19(4):523–529. doi:10.1097/EDE.0b013e318175dd47
- Draper G, et al. Childhood cancer in relation to distance from high voltage power lines in England and Wales: a case-control study. *BMJ*. 2005;330(7503):1290. doi:10.1136/bmj.330.7503.1290
- Engels S, et al. Anthropogenic electromagnetic noise disrupts magnetic compass orientation in a migratory bird. *Nature*. 2014;509(7500):353–356. doi:10.1038/nature13290
- Falcioni L, et al. Report of final results regarding brain and heart tumors in Sprague-Dawley rats exposed from prenatal life until natural death to mobile phone radiofrequency field representative of a 1.8 GHz GSM base station environmental emission. *Environmental Research*. 2018;165:496–503. doi:10.1016/j.envres.2018.01.037
- Fernández C, et al. Absorption of wireless radiation in the child versus adult brain and eye from cell phone conversation or virtual reality. *Environmental Research*. 2018;167:694–699. doi:10.1016/j.envres.2018.05.013
- Foerster M, et al. A prospective cohort study of adolescents' memory performance and individual brain dose of microwave radiation from wireless communication. *Environmental Health Perspectives*. 2018;126(7):077007. doi:10.1289/EHP2427
- Gandhi OP, et al. Exposure limits: the underestimation of absorbed cell phone radiation, especially in children. *Electromagnetic Biology and Medicine*. 2012;31(1):34–51. doi:10.3109/15368378.2011.622827
- Greenland S, et al. A pooled analysis of magnetic fields, wire codes, and childhood leukemia. *Epidemiology*. 2000;11(6):624–634. doi:10.1097/00001648-200011000-00003

- Hardell L, Carlberg M. Mobile phone and cordless phone use and the risk for glioma: analysis of pooled case-control studies in Sweden, 1997–2003 and 2007–2009. *Pathophysiology*. 2015;22(1):1–13. doi:10.1016/j.pathophys.2014.10.001
- Huss A, et al. Source of funding and results of studies of health effects of mobile phone use: systematic review of experimental studies. *Environmental Health Perspectives*. 2007;115(1):1–4. doi:10.1289/ehp.9149
- IARC Monographs Advisory Group. Advisory Group recommendations on priorities for the IARC Monographs. *Lancet Oncology*. 2019;20(6):763–764. doi:10.1016/S1470-2045(19)30246-3
- International Commission on the Biological Effects of Electromagnetic Fields (ICBE-EMF). Scientific evidence invalidates health assumptions underlying the FCC and ICNIRP exposure limits for radiofrequency radiation: implications for 5G. *Environmental Health*. 2022;21:92. doi:10.1186/s12940-022-00900-9
- INTERPHONE Study Group. Brain tumour risk in relation to mobile telephone use: results of the INTERPHONE international case-control study. *International Journal of Epidemiology*. 2010;39(3):675–694. doi:10.1093/ije/dyq079
- Levitt BB, Lai HC, Manville AM. Effects of non-ionizing electromagnetic fields on flora and fauna. Part 1: Rising ambient EMF levels in the environment. *Reviews on Environmental Health*. 2022;37(1):81–122. doi:10.1515/reveh-2021-0026. Part 2: Impacts. 2022;37(3):327–406. doi:10.1515/reveh-2021-0050. Part 3: Exposure standards, public policy, laws, and future directions. 2022;37(4):531–558. doi:10.1515/reveh-2021-0083
- Meo SA, et al. Mobile phone base station tower settings adjacent to school buildings: impact on students' cognitive health. *American Journal of Men's Health*. 2019;13(1). doi:10.1177/1557988318816914
- Panagopoulos DJ, et al. Real versus simulated mobile phone exposures in experimental studies. *BioMed Research International*. 2015;2015:607053. doi:10.1155/2015/607053
- Simkó M, Mattsson MO. 5G wireless communication and health effects: a pragmatic review based on available studies regarding 6 to 100 GHz. *International Journal of Environmental Research and Public Health*. 2019;16(18):3406. doi:10.3390/ijerph16183406
- Smith-Roe SL, et al. Evaluation of the genotoxicity of cell phone radiofrequency radiation in male and female rats and mice following subchronic exposure. *Environmental and Molecular Mutagenesis*. 2020;61(2):276–290. doi:10.1002/em.22343
- Thielens A, et al. Exposure of insects to radio-frequency electromagnetic fields from 2 to 120 GHz. *Scientific Reports*. 2018;8:3924. doi:10.1038/s41598-018-22271-3

- Waldmann-Selsam C, et al. Radiofrequency radiation injures trees around mobile phone base stations. *Science of the Total Environment*. 2016;572:554–569. doi:10.1016/j.scitotenv.2016.08.045
- Yakymenko I, et al. Oxidative mechanisms of biological activity of low-intensity radiofrequency radiation. *Electromagnetic Biology and Medicine*. 2016;35(2):186–202. doi:10.3109/15368378.2015.1043557
- Zothansiama, et al. Impact of radiofrequency radiation on DNA damage and antioxidants in peripheral blood lymphocytes of humans residing in the vicinity of mobile phone base stations. *Electromagnetic Biology and Medicine*. 2017;36(3):295–305. doi:10.1080/15368378.2017.1350584

Government reports, legal sources and policies

- National Toxicology Program. Technical Reports TR-595 (rats) and TR-596 (mice) on cell phone radiofrequency radiation. 2018. NTP: Cell Phone Radio Frequency Radiation
- NIEHS. Cell Phone Radiofrequency Radiation Studies (fact sheet). 2024. PDF
- *Environmental Health Trust v. FCC*, 9 F.4th 893 (D.C. Cir. 2021).
- U.S. EPA, Office of Radiation and Indoor Air (N. Hankin). Letter to J. Newton, EMR Network, July 16, 2002.
- FCC. Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation, FCC 96-326 (1996); Resolution of Notice of Inquiry, FCC 19-126 (2019). Exposure limits at 47 C.F.R. § 1.1310.
- Telecommunications Act of 1996, § 704, codified at 47 U.S.C. § 332(c)(7)(B)(iv).
- FCC. Accelerating Wireless Broadband Deployment by Removing Barriers to Infrastructure Investment, Declaratory Ruling and Third Report and Order, FCC 18-133 (2018).
- IARC. *Monographs on the Evaluation of Carcinogenic Risks to Humans*, Vol. 80: Non-Ionizing Radiation, Part 1: Static and Extremely Low-Frequency (ELF) Electric and Magnetic Fields. 2002.
- U.S. Department of the Interior, Office of Environmental Policy and Compliance (W. R. Taylor). Letter to the National Telecommunications and Information Administration on FirstNet and migratory birds, February 7, 2014. PDF
- Agence nationale des fréquences (ANFR). Decision on the iPhone 12, September 2023.
- Council of Europe, Parliamentary Assembly. Resolution 1815 (2011): The potential dangers of electromagnetic fields and their effect on the environment.

- France. Loi n° 2015-136 du 9 février 2015 relative à la sobriété, à la transparence, à l'information et à la concertation en matière d'exposition aux ondes électromagnétiques.
- California Department of Public Health. How to Reduce Exposure to Radiofrequency Energy from Cell Phones. December 2017.
- Los Angeles Unified School District. Board resolution opposing cell towers near schools (press release), May 2009. PDF
- Loudoun Now. School Board bans cell towers on campuses. September 25, 2024. Article
- International Association of Fire Fighters. Position on the health effects of radio frequency/microwave radiation in fire department facilities from base stations for antennas and towers. 2004.

Other reports and statements

- American Academy of Pediatrics. Letter to the Federal Communications Commission. 2012.
- Alster N. *Captured Agency: How the Federal Communications Commission Is Dominated by the Industries It Presumably Regulates*. Edmond J. Safra Center for Ethics, Harvard University; 2015.
- BioInitiative Working Group. *BioInitiative Report: A Rationale for Biologically-based Public Exposure Standards for Electromagnetic Radiation*. 2012, with later updates. bioinitiative.org
- International EMF Scientist Appeal. 2015. emfscientist.org